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From Graduate Student to Academic Change Maker: Analyzing the Impact of the 'Making Academic Change Happen' Curriculum on Early Career Faculty and Academic Staff

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Work in Progress: Assessing the Impact of the Making Academic Change Happen Curriculum on Emerging Engineering Educators, 2017 to 2024

Abstract

In this paper, we present preliminary research findings regarding the impact of the Making Academic Change Happen (MACH) curriculum. Engineering education graduate students who were enrolled in different doctoral programs were exposed to the MACH curriculum in one of three settings: the MACH workshop in 2017 that included several graduate students among the attendees (faculty, administrators, etc.); the Emerging Engineering Educators MACH workshop that was designed specifically for early career faculty and graduate students in 2019; and the National Science Foundation Revolutionizing Engineering Departments (RED) project change community monthly Zoom calls that occurred from 2015 to 2023. In this paper, we focus on graduate student attendees at the 2017 workshop. Through a series of interviews with these participants—both before and after their attendance at the 2017 workshop—we explored the influence of the MACH curriculum on these individuals and how it impacted their conception of academic change and leadership.

Introduction

As demand for improvements in STEM education continue in higher education, the rate of change remain lackluster. Despite the numerous pedagogical innovations—such as problem-based learning, active learning, etc.—that have been promoted on college campuses, change has remained elusive [1]. Results from a large-scale observational study of undergraduate STEM education indicated that faculty teaching has remained largely unchanged [1]. Stains et al. monitored nearly 550 faculty as they taught more than 700 courses at 25 institutions across the United States and Canada. Of the classrooms observed, 55% were characterized by the instructor using a "didactic" teaching style, defined as 80% or more of the class time consisting of lecturing. Of the remaining observations made, 18% consisted of a "student-centered" style, while 27% were defined as "interactive lecture." From these data, the researchers expressed concern: "Although we are unable to claim that our data are entirely representative, the sample size and diversity of courses and disciplines represented in our data suggest that these profiles and broad instructional styles provide a reliable snapshot of the current instructional landscape in undergraduate STEM courses taught at North American institutions [1]". Clearly if we seek to change STEM education in colleges and universities, we will need to do more than change pedagogies. Our work with faculty, administrators, graduate students, and post-doctoral students has led us down a different path. Rather than focus only on creating new teaching strategies, we have approached academic change as a professional development challenge; in order for stakeholders to change STEM education, they need to acquire new capabilities as change leaders.

Since 2012, the Making Academic Change Happen (MACH) workshop has filled the needs of academics for research-based skills development and assistance that can help them

build their capacity for creating and leading change. Offered initially as a stand-alone development workshop on the campus of [X Institution], the MACH workshop curriculum provides specific knowledge, skills, and abilities (KSAs) that research suggests are key to successful change projects [2], [3]. These KSAs are frequently noted in the research literature produced by fields such as higher education theory and organizational change management but are often not a part of the disciplinary preparation of engineering faculty, administrators, post-doctoral students, and graduate students. Graduate students are particularly in need of these KSAs, since many of them are hired to do important work in programs and departments related to improving undergraduate STEM education [1], [4], [5]. Our work with faculty and administrators has been documented elsewhere [6], but our current project traces the impact of the MACH curriculum on graduate students, those who represent the future of STEM education.

The Making Academic Change Happen Curriculum

When the development of the MACH curriculum began in 2012, members of the MACH team first reviewed the available teaching workshops offered in the US, such as the Excellence in Civil Engineering Education (ExCEEd) workshop and the National Effective Teaching Institute (NETI), among others. Teaching effectiveness workshops are a key component of engineering faculty development because they introduce attendees to the principles of effective pedagogy in a supportive environment. As the research of Henderson, et al has demonstrated, focus on improving instruction is only one component of the complex STEM education system [5]. In order to make change happen, the MACH development team explored the research literature of fields outside of engineering education; this research identified skills employed by successful change agents in diverse fields. From this perspective, we designed hands on sessions on specific topics (e.g. partnership development, generating buy-in, institutional context, and identity discovery) [2], [3], [7-11]. By introducing participants to research-proven strategies for making large scale change happen on their home campus, we are closing the research-to-practice loop in order to improve STEM education. MACH curricula have been deployed in a variety of contexts, from the National Science Foundation's Revolutionizing Engineering Departments (RED) program to the Kern Entrepreneurial Engineering Network (KEEN) conference, and summer professional development workshops for faculty, along with targeted consulting with numerous institutions. From 2012 to 2017, the MACH workshop was offered annually on our campus to STEM faculty and administrators.

In 2017 and 2019, the focus of the workshop was emerging engineering educators, both graduate students and post-doctoral students who work in STEM fields. By offering a targeted MACH for these stakeholders, we sought to impact the next generation of STEM faculty and administrators. Conventionally, the primary experience of graduate training is to be introduced to disciplinary research and then be provided with a means to gain further competence. We see, however, that new engineering educators are tasked with developing new courses, curricula,

and programs. These initiatives require additional skills or areas of expertise: advising, mentoring, curriculum development, imaginative vision, program assessment, etc. None of these skills are likely addressed in a typical engineering Ph.D. curriculum. For these reasons, we believed that new engineering educators who envision themselves as change agents could work to adopt the disposition and skills of a change agent. The 2017 MACH workshop (NSF NSF 1723385) was focused specifically on emerging educators, and we structured the event in order to give educators time and guidance to start on their path as engineering education innovators. To determine how the MACH curriculum could impact these attendees, we designed a series of pre- and post-workshop interviews.

Research Focus

For the 2017 study, we focused on change leadership as a separate focus of leadership development. We believed this focus was an appropriate target of inquiry, given the following constraints:

1) the regular and repeated calls for change leveled at higher education, emerging both from external voices and internal voices (e.g., the National Academy of Engineering's "Engineer of 2020" recognizes that undergraduate students must be work-capable with skills beyond technical expertise) [12],

2) change leadership skills are fundamentally different than traditional leadership and management skills used in academia (e.g., advocating for program approval in front of 200+ faculty is a different skill than advocating to a single faculty member to accept an unpleasant teaching assignment [8], and

3) change leadership development enhances other important features of leadership development like cultural competency, institutional awareness, and social capital [13].

As part of the 2017 workshop offering, we proposed a project to focus on individuals' experiences in the acquisition, development, and deployment of change skills to positively affect their campuses and communities. The project explored the experiences of graduate students who were at the dissertation stage as they worked to acquire change leadership skills. This population is particularly vulnerable in terms of departmental and institutional power differentials. Therefore, how they experience and practice change leadership development is determined in a large measure by those who are in positions of power above them, such as dissertation advisers, department faculty, and others. We theorized, based on the research of Kezar and Lester, that graduate students who worked to create academic change would do so from the bottom up, as examples of "grassroots leadership" [10], rather than leadership that derives from positional authority. The premise of grassroots leadership as a concept captures the strategies used by faculty who typically exist in disempowering situations relative to making major change [10]. The lenses for exploring this type of leadership development (change + grassroots) are especially apt as so much of the work of educational progress is

performed by eager, excited, engaged educators who report so many challenges with their work.

Support from NSF funded 16 emerging educators to attend the MACH workshop during the summer of 2017. Of the 16, 9 agreed to participate in the study, and we conducted interviews with them before the workshop, using a pre-determined set of interview questions. These questions covered their current position and role and their leadership style. In addition, the subjects were asked to reflect on the approaches to leadership used by others (such as department head, dean, etc.) in their departments and university. The focus of the first set of questions was on the subject's understanding of the concept of leadership both in theory and in practice. In addition to questions about leadership, we asked a series of questions about change-making processes, such as the process they used themselves, their assessment of another's person's skills as an agent of change, the process for change making in their department, and the relationship between formal authority and the process of change. This last question was intended to understand the individual's views of the importance of formal authority in making change.

The final questions in the interview captured the individual's expectations regarding MACH and how the workshop could impact their development as a change maker. By asking individuals about their expectations for the workshop, we were able to isolate individuals' attitudes about change and the contribution of the workshop to their development as change makers.

After the conclusion of the MACH workshop, attendees who completed the pre-workshop interviews were invited to be interviewed again. 7 of the 9 who initially agreed to be interviewed pre-workshop agreed to participate in the post-workshop interviews. In addition to the questions that comprised the pre-workshop interview, we asked new questions in order to capture the impact the attendees saw from MACH on their change work. For example, we asked if the attendees saw a change in their understanding or approach to leading change since they attended the workshop, and whether they could tie those changes to specific content introduced at MACH. We also asked a series of questions related to their MACH experiences, such as the progress they have made with a change project after the workshop, the usefulness of MACH tools to their change project work, and any specific changes they have made to their approach to change on the basis of what they learned at MACH.

Selected Interview Results from 2017 MACH Workshop

From the seven participants, we have learned how the MACH workshop and its change-focused curriculum influenced their views on change at this early stage of their academic careers. When asked how the MACH workshop experience altered their understanding of leading change, Participant A said that the workshop "expanded my vision of leadership." When asked to provide additional detail about the changed vision, Participant A explained:

"The MACH facilitators seem to be the role models [for leadership change] in the sense

that when you see them talking and elaborating, discussing the strategies of leadership and their style of executing it, even within the short span of time we were in the MACH workshop, that had a deeper impact on me. To see leaders in action made it easier to understand the [workshop] material."

When asked to give specific examples of how the workshop curriculum impacted their change work on their own campus, Participant A described their work as a laboratory technician, collaborating with three other teaching assistants. The MACH curriculum empowered them to apply new principles, such as listening to the ideas of others, giving other TAs and lab students ownership of the project, and taking time to encourage others to share their ideas:

"I think [the workshop] has given me techniques about how I can handle challenges. . . When you are opposed to a good idea, if there are no supporters, that's one thing, but if you're straight away opposed, how do you handle that? That was also useful. But I'm still not in that space where I've applied it to my department, so I'm keeping those tools and resources in my back pocket right now."

In the second stage of our project, we plan to follow up with Participant A in order to understand if they have moved the MACH tools from a "back pocket" to the forefront in the academic change work they are pursuing now.

For Participant B, the challenge they experienced before the MACH workshop focused on working as a graduate assistant for a course that had inherent problems, primarily with grading. In their interview, Participant B reflected that while they could see that grading in the course was "not good," their position as a GA meant that they didn't have adequate authority to make the changes that they saw as necessary: "I don't feel as if I'm in a position to jump out and start condemning these people [other GAs, as well as the name professor of the course] and telling them like, 'No, you're wrong. Here's what you need to do.'" Thus, in a manner similar to Participant A, Participant B sees their position authority inadequate to initiating and leading an important academic change. Again, in the second stage of our project, we plan to interview h Participant B, since we want to know if their change in status—from GA to professor—has impacted their ability to implement important and needed changes.

Participant C identified an important change in their perspective as a result of their MACH experience: "I have acquired a more realistic view of the possible resistance that I might find in pushing forward my change ideas." When asked to explain this insight with an example, Participant C focused on specific tools introduced at the MACH workshop and how they could be used to move their change project forward:

"I have very definite plans and ideas as to what I want to do with my PhD, and one of the people who has supported me the most is the provost [at my current institution]. He has a

slightly different idea of the things he wants me to do when I go back to campus. For some time I thought it was okay to be as clear possible, saying "No, that's not what I am doing here, this is what I'm actually doing. And then I usually would encounter a reaction [from him] that I didn't want to trigger. Now by trying to understand where he's coming from and the wider look at the university [that he is taking], I can understand better and say, 'Well, this is how I can contribute to your view. . . this is how I can contribute to that view you have.'"

Since their time at MACH, Participant C has moved on from the institution they discussed during the interview. In our next stage of interviews, we plan on probing further how this tool and others have been useful to the participant in their current academic context.

Next Steps in Research Work

In addition to the 2017 MACH workshop, we offered another graduate student-focused workshop in 2019. We collected interview data with several of those attendees using a different set of interview questions, since the 2017 and 2019 offerings were not funded as part of the same grant. As part of the next steps in our research work, we plan to review the 2019 data to identify alignment with the 2017 study. Given what we have learned from the RED projects [14-16], we see yet another data source available to enrich the study of graduate students as they pursue their academic careers.

It has been six years since the initial group of MACH attendees were interviewed. In the intervening time, each has moved on from their graduate study to academic positions. In the next stage of this project, the researchers will conduct interviews again, this time focusing on MACH attendees' development as leaders and change agents as they have experienced it during their progress in their professional lives. As a result of this research, we hope to show the continuing influence of the MACH curriculum on these individuals who represent the future of STEM education.

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